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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/347,583	06/30/1999	TUQIANG NI	LAM1P111/P05	4070

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EXAMINER

BROWN, CHARLOTTE A

ART UNIT	PAPER NUMBER
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1765

DATE MAILED: 06/18/2002

11-

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.
09/347,583

Applicant(s)
Ni et al.

Examiner
Charlotte A. Brown

Art Unit
1765



-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136 (a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on Feb 12, 2002
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11; 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-13 is/are pending in the application.
- 4a) Of the above, claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-13 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claims _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgement is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
*See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. § 119(e).
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s). _____ 6) ☐ Other:

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DETAILED ACTION

1. Applicant's arguments with respect to claims 1-13 have been considered but are moot in view of the new ground(s) of rejection.
2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.
3. Claims 1-13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ishida et al. (US 5,213,658) in view of Hills et al. (EP 0676790 A1).

Ishida teaches a plasma processing method and a plasma processing apparatus. A substrate to be processed is placed on a high frequency electrode. This reads on the applicant's limitation of a chuck for supporting a wafer. A laminated film to be etched and a resist pattern are formed on the substrate. Focus rings surround the sides of the wafer forming a barrier (Figure 1A). Permanent magnets are embedded in the focus rings. At this time, the amount of electric current flowing through the electromagnets is set so that the height of the focus ring is suitable for obtaining the best uniformity when the uppermost layer of the laminated film formed on the substrate is etched (Column 3, lines 22-35). A reactive gas is introduced into the chamber containing CF₄, CHF₃, Cl₂, or HCl. The uppermost film is etched. This reads on the applicant's limitation of a barrier having a first position relative to the wafer wherein the first position

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facilitates etch uniformity for a chemically driven etch process. Then, the second layer is etched. The focus ring is floated to a position suitable for obtaining the best etching uniformity for the material of the second layer. This reads on the applicant's limitation of a movable barrier. The reactive gas is introduced into the processing chamber and the high-frequency power is applied between the electrodes so that plasma of the reactive gas is generated. Uniform etching is performed for each layer. In order to obtain optimal etching conditions, the height of the focus ring may be adjusted during the etching operation (Column 4, lines 1-9). This reads on the applicant's limitation of a barrier having a second position that does not interfere with the etch uniformity of an ion driven etch process.

Unlike the claimed invention, Ishida does not require that the focus ring have a first position that is capable of restricting diffusion of gases over the wafer within the plasma processing apparatus to the wafer.

Hills discloses a focus ring for semiconductor wafer processing in a plasma reactor. The focus ring protects the wafer periphery from gases or plasmas which otherwise have a faster flow rate near the wafer periphery (Column 1, lines 1-6). Therefore, the focus ring acts as a diffusion barrier. The focus ring reduces the non-uniformity of the wafer etch rate which is caused by non-uniform plasma distribution across the wafer. The focus ring is supported by a lift mechanism which can move the focus ring.

It is the examiner's position that a person having ordinary skill in the art would have found it obvious to modify Ishida by using the focus rings as diffusion barriers as taught by Hills. The

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method of using focus rings as diffusion barriers would have been anticipated in order to avoid non-uniform processing of the substrate.

4. Any inquiry concerning this communication from the Examiner should be directed to Charlotte A. Brown whose telephone number is (703) 305-0727. The examiner can normally be reached during the hours 9:00AM to 6:30PM.

The fax phone numbers for the organization where this application or proceeding is assigned are 703-872-9310 for regular communications and 703-872-9311 for After Final communications.

CAB

June 12, 2002



ROBERT KUNEMUND
PRIMARY EXAMINER